2019

2019 Costata Romanesco-type Zucchini Trial

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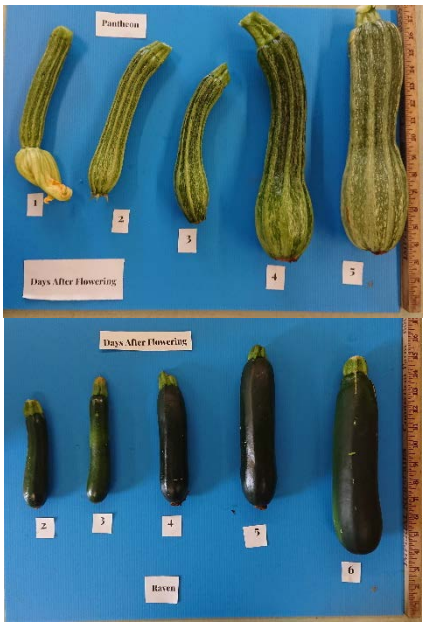
The heirloom zucchini Costata Romanesco remains popular with gardeners, farmers market customers and foodies because of its distinctive nutty flavor and appealing texture, and the flavor and size of the edible flowers. The fruit is grey-green with light speckles and prominent ribs, making it instantly recognizable in the market. This creates a difficulty for farmers, because Costata Romanesco is a very inefficient variety to grow. The plants are large and vining, requiring more space than more typical zucchini varieties, yields are low, and the variety lacks the disease resistances of modern hybrid zucchini varieties.



A cocozelle (Pantheon, top) and a zucchini (Rave, bottom). Note that the zucchini is cylindrical while the cocozelle begins to bulb 2 days after flowering.

Have you ever wondered why, with dozens of zucchini varieties on the market and new ones released every year, Costata Romanesco remains so unique? The explanation is the Costata Romanesco is not actually a zucchini. It belongs to a different cultivar group within *Cucurbita pepo* subspecies *pepo*, the cocozelle squash, and is as distinct from zucchini as zucchini is from sugar pumpkin. Cocozelle squash have been grown in southern Italy since the 1500s, and were widely grown in southern Europe by 1800. The zucchini appears to have been independently developed in northern Italy after 1850; it was valued for producing marketable fruits in only 40 days after planting and having higher yields than the cocozelle. The zucchini was introduced to California in the early 20th century and quickly came to dominate the commercial trade, while the cocozelle largely disappeared. Costata Romanesco became the only common cocozelle variety in the US, although seed of other heirloom varieties is available from US distributors for Italian seed companies.

Fortunately for both growers and consumers, the demand for vegetable varieties developed specifically for market farming has led to development of new cocozelle varieties which combine the agronomic advantages of modern zucchini varieties with the distinctive flavor, texture and appearance of Costata Romanesco. The objective of this trial was to evaluate five new varieties for performance in Rhode Island.

Trial Methods

The trial included four hybrid cocozelle varieties —Cassia, Flaminio, Pantheon and Bravada – and a striped, nutty-flavored variety Green Tiger,

which is actually a zucchini rather than a cocozelle. Costata Romanesco was included as the standard for comparison. Seeds were obtained from the suppliers listed in Table 1.

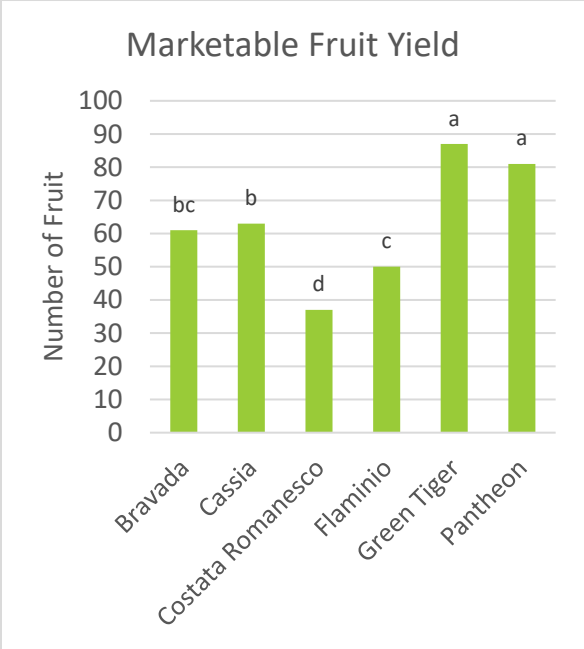
Entry	Source
Bravada	Johnny's Selected Seeds
Cassia	Osborne Seeds
Flaminio	Johnny's Selected Seeds
Pantheon	Johnny's Selected Seeds
Green Tiger	Harris Seeds
Costata Romanesco	Johnny's Selected Seeds

The entries in the trial, and sources for seed used. Bravada is no longer available. Cassia is available as certified organic seed.

Trial entries were seeded.,';[into 50-cell plug trays filled with Metromix on May 13th. Seedlings were grown in the greenhouse until transplanting. On May 30th seedlings were transplanted into raised beds covered with black plastic mulch. Each bed had 2 lines of drip tape for irrigation and fertigation. Plants were spaced two feet apart within the row, and beds were 5 feet on center. The trial used a randomized block design with four replications and 10 plants per plot. 'Bravada' was only included in two replications due to limited seed supply. All plants were covered with perforated clear plastic rowcover supported on hoops immediately after transplanting; the cover was removed on June 25th when the first female flowers were observed. Harvest began July 2 and the trial was harvested every 2 to 3 days until August 1 for a total of 14 harvests.

Yield Results

Costata Romanesco averaged only 37 marketable fruit per plot, significantly lower than any of the hybrid entries. Pantheon and Green Tiger had the highest yields at 81 and 87 marketable fruit per plot, significantly more than the other entries. Over 90% of the fruits set by Cassia, Flaminio and Green Tiger were marketable. By comparison, 25% of Costata Romanesco fruit were unmarketable, mostly due to Plectosporium blight lesions. Pantheon averaged 82% marketable fruit, with the primary cause of loss being curved and fasciated fruit at the first harvest. Pantheon averaged 26 fruit per plot at the first harvest, much more than any other variety. However, most of the fruit were unmarketable due to shape defects. Green Tiger fruits have a strong tendency to snap cleanly where the peduncle joins the fruit, rather than twisting off where the peduncle joins the vine. This complicates harvesting, and may render the fruit unmarketable.



Marketable fruit yields for the six trial entries. Yields are ameans across 4 plots, each with 10 plants. Columns with the same letter were not significantly different at α = 0.05.

Summer squash yields can be low because plants do not produce many female flowers, or because the female flowers abort before the fruit reach marketable size. Abortion can be caused by pollination failure, stress, or limited carry capacity in the

Entry	Female Flowers	Developed Fruit	Marketable Fruit
Bravada	91^{ab}	83%^{bc}	81%^{bc}
Cassia	85^{abc}	82%^{c}	91%^{ab}
Costata Romanesco	71^{bc}	71%^{d}	75%^{c}
Flaminio	68^{c}	79%^{cd}	94%^{a}
Green Tiger	100^{a}	95%^{a}	92%^{a}
Pantheon	102^{a}	93%^{ab}	82%^{bc}

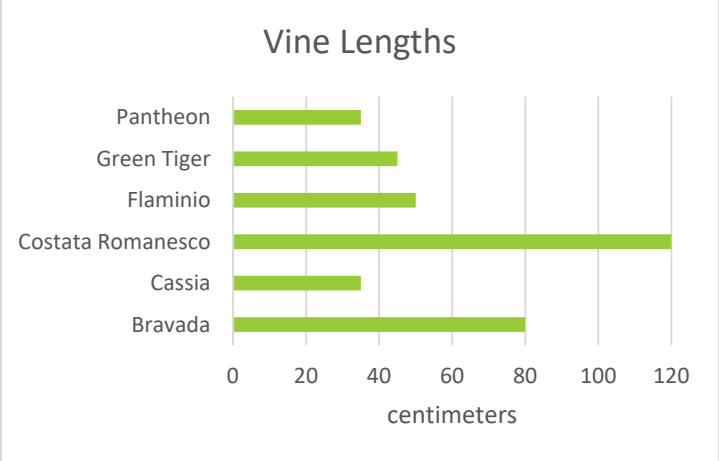
Potential and realized yields for trial entries. All values are means of four 10-plant plots. Superscript letters indicate significant differences; values with the same letter within a column do not differ at α=0.05.

plant. Green Tiger and Pantheon both produced the most female flowers, averaging 100 and 102 flowers per plot, respectively, and had less than 10% aborted flowers. In comparison, Costata Romanesco averaged only 71 female flowers per plot, and only 71% of flowers developed into fruit of marketable size. Flaminio produced fewer female flowers, averaging only 68 per plot, but 79% of those flowers produced fruit, and 94% of fruit were marketable, resulting in significantly higher yields than Costata Romanesco.

Plant Characteristics

In addition to low yields of marketable fruit, Costata Romanesco is a large plant, requiring significantly more space than a typical hybrid zucchini. Vine length was measured on July 15, 8 weeks after seeding. As expected, Costata Romanesco had the longest vines, 120 cm (48 inches) from the crown to the tip of the main stem. Cassia and Pantheon were only 35 cm (13.8 inches) long. Pantheon had a single main stem, similar to Costata Romanesco, but Cassia had multiple basal branching. The other entries were intermediate to these extremes, ranging from 45 cm (18 inches) for Green Tiger to 80 cm (32 inches) for Bravada.

Days from seeding to female anthesis ranged from 44 for Bravada to 48 for Costata Romanesco, but differences were not significant. Days to male anthesis ranged from 44 to 50, with Pantheon, Cassia and Green Tiger all producing their first male flowers significantly later than Flaminio, Bravada and Costata Romanesco. The first flowers were female in Pantheon, Cassia and Green Tiger, but male in Costata Romanesco because the first flush of female buds senesced without opening. Flaminio and Bravada produced both male and female flowers from the first days of flowering.



Vine lengths from crown to growth tip of main stem for trial entries. Vines were measured on July 15th, two months after seeding and at the midpoint of harvest.

The only significant disease problem was Plectosporium blight, caused by the fungus *Plectosporium tabacinum.* The disease first appeared in one plot of Costata Romanesco on July 17th but quickly spread. Disease severity was

rated on July 25th. There were no significant differences between entries, and no signs of tolerance or resistance.

Conclusions

Growers are strongly encouraged to trial the new hybrid cocozelle varieties on their farms, as all of them out-perform Costata Romanesco. Pantheon was the top performer in this trial. It is a nicely compact plant with a good growth habit, and yields well with few wasted blossoms. Green Tiger yielded well but was challenging to harvest, and blossoms drop immediately after anthesis so the fruit could not be sold with blossoms attached. Cassia would be the best choice for selling Italian-style with the blossoms attached, as the fruit are very long and thin, reaching six inches at anthesis. Plants are compact like Pantheon, but with more basal branching,

A plant of Pantheon on July 15. Note the upright growth habit and compressed internodes.

Acknowledgements

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Fruits from the six trial varieties showing development over time. Seed development is noticeable by 5 days after flowering.

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